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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/805,632	03/22/2004	Dmitriy Yerebin		1462

7590 11/16/2004  
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EXAMINER


SOUW, BERNARD E

ART UNIT PAPER NUMBER

2881

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/805,632	Applicant(s) YEREMIN ET AL.	
	Examiner Bernard E Souw	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☐ This action is **FINAL**.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☒ Claim(s) 1-4 and 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Objections to the Specification*

1. The abstract of the disclosure is objected to because:

(a) Lines 1-2 are not in proper English: "*A method of evaluating of a measuring electron microscopes*". The examiner suggests to remove the second word [*of*] and change the sentence into "*A method of evaluating [~~of~~] a measuring electron microscopes*".

Correction is required. See MPEP § 608.01(b).

(b) Lines 1-3 from bottom: "... *making a conclusion that the microscope can not be used for measurements and needs an adjustment*" should better read "... *making a conclusion [~~that~~] --whether or not-- the microscope can [~~not~~] be used for measurements and [~~needs~~] --whether or not-- an adjustment --is needed--"*

2. Page 1 of the specification is objected to, because it does not conform to the convention for the content of a specification. See MPEP 608.01(a), (A) to (K).

3. Page 2 of the specification is objected to because the language used in the first line is not in proper English: "*The present invention relates to methods of evaluating of scanning electron microscopes*". The examiner suggests to remove the word [*of*] and change the sentence into "*The present invention relates to methods of evaluating [~~of~~] scanning electron microscopes*".

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Drawings***

5. The drawings of Fig.2 is objected to because of some informalities:

- (a) In step 2, the wording "*Orienting of the test object ..*", should better read, "*Orienting [~~of~~] the test object ..*".
- (b) In step 9, the wording "*Analysing of obtained set of values ...*" should better read, "*Analyzing [~~of~~] --the-- obtained set of values ...*".
- (c) In step 10, the wording "*Making the conclusion about ...*" should better read, "*Making [~~the~~] conclusion about ...*".
- (d) In the text of Fig. 2, "*... according to invention*" should better read "*... according to ~~the~~ invention*".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Objections to the Claims***

6. Claim 1 is objected to because of the following informalities:

- (a) In the claim's preamble the wording "*A method of evaluating of a measuring electron microscope...*" should better read "*A method of evaluating [~~of~~] a measuring electron microscope...*".
- (b) On line 3, the wording "*microscope, which will be used ...*" would be better expressed as "*microscope [~~which~~] that will be used ...*".
- (c) On line 7, the word "*vertically*" is a relative term and does not describe any definite orientation; it is therefore deemed indefinite (see § 112//¶.2 below).
- (d) Still on line 7, the wording "*electronic beam*" should correctly read "*electron[~~ic~~]ie beam*".
- (e) The last claim limitation on page 13, "*... conclusion that the microscope can not be used for measurements and needs an adjustment*" would be better expressed as "..."

*making a conclusion ~~[that]~~ --whether or not-- the microscope can ~~[not]~~ be used for measurements and ~~[needs]~~ --whether or not-- an adjustment --is needed--".*

7. Claim 2 is objected to because of syntax error in line 3: the wording "*having the straight edge*" should correctly read "*having ~~[the]~~ a straight edge*". The examiner suggests to entirely modify claim 2 into "*.... using as ~~[the]~~ test object a cleavage surface of an electrically conductive ~~[material]~~ monocrystal having a straight edge*".

8. Claim 3 is objected to because the term "etc." is an indefinite claim language (see § 112/¶.2 below).

9. Claim 4 is objected to because of the following informalities:

The wording on lines 2-3, "*a relief ledge which is formed ..... chemical etching and having ...*" would be better expressed as "*a relief ledge, which is formed ..... chemical etching and ~~[having]~~ has ...*", or "*a relief ledge ~~[which]~~ that is formed ..... chemical etching and ~~[having]~~ has ...*", or "*a relief ledge ~~[which is]~~ formed ..... chemical etching and having ...*".

10. Claim 6 is objected to because the claim limitation is difficult to understand: It would better read, "*further comprising the step of suppressing video signal noises before localizing ~~[of]~~ the edges of the test object ~~[on each line]~~*".

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "*vertically*" used in claim 1 is a relative term that has no reference with regard to its orientation. The term "*vertical(ly)*" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite direction, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

12. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention

The term "etc." used in claim 3 is a specific term that renders the claim indefinite. The term "*etc.*" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al. (USPAT 6,570,157) in view of McAdams et al. (USPAT 3,876,879) and the general knowledge in the art.

► Singh et al. disclose a method for evaluating a measuring electron microscope, as recited in the Abstract, lines 1-6 and Col.3/ll.55-64, the method comprising the steps of (a) setting such modes of operation of a microscope that will be used for subsequent measurements of sizes and line edge of roughness, as recited in the Col.1/ll.40-56; (b) introducing a test-object which has a known straight edge into a chamber of the microscope, as recited in Col.1/ll.16-20 and Col.2/ll.3-6; (c) orienting the test object on a stage of the microscope (as disclosed by McAdams in Col.2/ll.29-31) so that the edge of the test object is arranged "*vertically*", i.e., perpendicular to the microscope scan direction, which not only is inherent in Singh's as well as conventional, but specifically also taught by McAdams et al. in Col.1/ll.40-44 and Col.2/ll.29-42; (d) scanning the test object with an electron beam, which is inherent in all scanning electron microscopes, as generally known in the art; (e) obtaining an image of the (edge of) the test object and saving the image in a digital form, as recited by Singh's et al. in Col.8/ll.22-24 and Col.8/ll.41-47, which is also conventional as well as generally known in the art; (f)



localizing the edge of the test object on the image of each line of scanning and (g) producing and storing a set of values of a coordinate  $X(i)$  which correspond to a position of the edge of an  $i$ -th line of scanning, as recited by Singh et al. in Col.3/ll.18-22 and Col.8/ll.14-17; (h) approximating the sets of values  $X(i)$  with a straight line, as specifically recited by Singh et al. in Col.4/ll.17-21 & 57-62, and calculating deviations  $\Delta(i)$  of coordinates  $X(i)$  from a straight line on each line of scanning, as implicated by Singh's in Col.4/ll.5-21 & 43-63, Col.9/ll.54-61, Col.11/ll.21-28, Col.16/ll.1-27, and conventionally practiced by those generally skilled in the art; (i) analyzing a set of values of the deviations  $\Delta(i)$ , calculating an average and a maximal deviation to see whether a maximum value of deviation exceeds an acceptable tolerance of measurement, and making a conclusion whether or not the microscope can be used for measurement and whether or not it needs an adjustment, as recited by Singh et al. in Col.9/ll.54-61, Col.11/ll.21-28, and in Col.13/ll.31-55, more specifically in Col.13/ll.37-40, Col.14/ll.37-40, Col.15/ll.16-20 and Col.15/ll.62-67.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to orient Singh's test object on a stage of the microscope so that the edge of the test object is arranged "*vertically*", i.e., perpendicular to the microscope scan direction, as disclosed, e.g., by McAdams et al. in Col.1/ll.40-44 and Col.2/ll.29-42, since such arrangement is not only conventional but also effective for taking measurements and calibrations, as generally known to those ordinarily skilled in the art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to expand Singh's evaluation and calibration methods to include

other measuring parameters that belong to scanning electron microscopes, as suggested by Singh et al. in Col.16/II.1-27.

14. Claims 2-4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al., McAdams et al. and the general knowledge in the art, and further in view of Cresswell et al. (USPAT 5,920,067), hereinafter Cresswell'067.

Singh et al. as modified by McAdams et al. and the general knowledge in the art disclose all the limitations of claim 2, as previously applied to the parent claim 1, except the recitation of using as test object a cleavage surface of an electrically conductive monocrystal having a straight edge.

Cresswell'067 describes a method for evaluating a measuring electron microscope using monocrystalline test objects, as recited in the Title and in the Abstract.

Regarding claims 2-4, Cresswell's test object 26 is made of a monocrystalline silicon, as shown in Figs.2-4 and recited in Col.11/II.10-12, the material having been previously made electrically conductive, as specifically recited in Col.10/II.59-63. As shown in Fig.3, Cresswell's test objects 60 or 62 have straight edges corresponding to the <110> directions of a monocrystalline silicon material, as recited in Col.12/II.30-67. It is generally known in the art that crystalline directions, such as <110> in Fig.3, are substantially straight.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a straight test object of microscopic size from a

monocrystalline material, since straight edges can be naturally obtained from monocrystalline objects by cleaving or chemical etching, as generally known in the art.

Specifically regarding claims 4 and 6, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a relief ledge as test object, since such a relief ledge has a higher contrast due to the thicker material substance along its edge, thus rendering more accurate measurements by virtue of better signal-to-noise- ratio, as generally known to one of ordinary skill in the art.

Regarding claim 6, it would have been therefore also obvious to one of ordinary skill in the art at the time the invention was made to tune the microscope recording system so as to minimize and suppress the noise of the video signal prior to taking any measurement, including the step of localizing the edges of a test object.

15. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh et al., McAdams et al. and the general knowledge in the art, and further in view of Honerkamp ("Stochastic Dynamical Systems", VCH Publishers, Inc., 1994; Ch.3.4, pgs. 74-86).

Singh et al. as modified by McAdams et al. and the general knowledge in the art disclose all the limitations of claim 5, as previously applied to the parent claim 1, except the recitation of using a method of least squares to approximate a straight line.

The method of approximating a straight line to determine the performance and calibration parameters of a scanning electron microscope has been previously rendered

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obvious by Singh et al., specifically by using curve-fitting algorithms, as recited in Col.4/II.5-10, Col.4/II.57-62, Col.9/II.55-65, Col.11/II.24-27 and Col.16/II.2-11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the least square method to approximate a model-curve including a straight line as a special form of a curve, to best-fit a data set, since the method is quite well-known and its use for curve-fitting is conventional, as taught by Honerkamp in Chapter 3.4, specifically section 3.4.1, lines 4-7.

### ***Communications***

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E Souw whose telephone number is 571 272 2482. The examiner can normally be reached on Monday thru Friday, 9:00 am to 5:00 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 571 272 2477. The central fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306 for regular communications as well as for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

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November 1, 2004



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SUPERVISORY PATENT EXAMINER  
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